

Claims:

1. A method for protection switching in a point-to-multipoint network, the point-to-multipoint network including a first network end node (1) connected by at least one first connection (4,41-43) to at least one second network end node (21-24), wherein at least one protected second network end node (21-22) of the at least one second network end nodes (21-24) is further connected via at least one second connection (5,51;5,52;5,54) to said first network end node (1), the protection switching method comprising the steps of a applying a linear protection switching method to at least one point-to-point part (1,21,4,41; 1,22,4,42; 1,23,4,43; 1,21,5,51; 1,22,5,52; 1,24,5,54) of the point-to-multipoint network independently of switching of other point-to-point parts (1,21,4,41; 1,22,4,42; 1,23,4,43; 1,24,5,54; 1,21,5,51; 1,22,5,52), whereby a point to point part (1,21,4,41; 1, 22, 4, 42; 1, 23, 4, 43; 1, 24, 5, 54; 1, 21, 5, 51; 1, 22, 5, 52) includes said first network end node (1) connected to one second network end node (21-24) via at least one of said first connections (4,41-43) and second connections (5,51-52,54).

2. A method for protection switching as claimed in claim 1, wherein the method is applied in a 1+1 protected point-to-point part (1,21,4,41,5,51; 1,22,4,42,5,52) whereby a protected point-to-point part (1,21,4,41,5,51;1,22,4,42,5,52) includes at least one point-to-point part (1,21,4,41; 1,22,4,42; 1,23,4,43; 1,24,5,54; 1,21,5,51; 1,22,5,52) connecting said first network end node (1) and said second network end node (21-24) via at least one of said at least one first connections (4,41;4,52;4,43) and a protected point to point part (1,21,4,41,5,51;1,22,4,42,5,52) further includes at least one point-to-point part (1,21,4,41; 1,22,4,42; 1,23,4,43; 1,24,5,54; 1,21,5,51; 1,22, 5, 52) connecting the same second network end node (21-22) to said first network end node (1.) via a at least one of said at least one second connections (5,51;5,52;5,54).

3. A method for protection switching as claimed in claim 1, wherein the method is applied in a 1:1 protected point-to-point part (1,21,4,41,5,51; 1, 22, 4, 42, 5, 52).

4. A method for protection switching as claimed in claim 1, wherein as linear protection switching method a unidirectional protection switching method is used.

5. A method for protection switching as claimed in claim 1, wherein as the linear protection switching method a bi-directional protection switching method is used.

6. A method for protection switching as claimed in claim 1 wherein said linear protection switching method includes the steps of performing a signal fail or signal degrade check for each first connection (4,41-43) and each second connection (5,51;5,52;5,54) of a protected point-to-point part (1,21,4,41;5,51;1,22,4,42,5,42), and if the result of the signal fail or signal degrade check satisfies a switch condition: switching a point-to-point part (1,21,4,41; 1,22,4,42; 1,23,4,43; 1,21,5,51; 1,22,5,52; 1,24,5,54) associated with said switch condition to said at least one of the at least one second connections (5,51;5,52;5,54), said switching step including disconnecting the first connections (4,41-43) to the second network node (21-24) of the point-to-point part (1,21,4,41; 1,22,4,42; 1,23,4,43; 1,2X,5,51; 1,22,5,52; 1,24,5,54) associated with said switch condition and if this second network end node (21-24) is a protected second network end node (21-22): re-routing a data flow from or to the protected second network end node (21-22) via the second connections (5,51-52,54) connected to the protected second network end node (21-22).

7. A method for protection switching as claimed in claim 6, wherein the steps of performing the signal fail or signal degrade check and switching to the second connection (5,51-52,54) are performed at the same network end node (1,21-24).

8. A method for protection switching as claimed in claim 7, wherein the method is performed at the protected second network end node (21-22).

9. A method for protection switching as claimed in any of the claim 7, wherein the method is performed at the first network end node (1).

10. A method for protection switching as claimed in claim 6, wherein the signal fail or signal degrade check includes the step of checking at the protected second network end node (21-22) the quality of a network signal transmitted from the first network end node (1) to the protected second network end node (21-24) via simultaneously said first connection (4,41-43) and said at least one second connection (5,51-52,54) and the switch condition is satisfied if the quality of the network signal transmitted via said first connection (4,41-43) is lower than the quality of the network signal transmitted via the at least one second connection (5,51-5,54).

11. Method for protection switching as claimed in claim 6, wherein the signal fail or signal degrade check includes the step of checking at the protected second network end node (21-22) the quality of a data packet transmitted from the first network end node (1) to the protected second network end node (21-24) via simultaneously said first connection (4,41-43) and said at least one second

connection (5,51-52,54) and the switch condition is satisfied if the quality of the network signal transmitted via said first connection is lower than the quality of the data packet transmitted via the at least one second connection (5,51-52, 54).

12. Method for protection, switching as claimed in claim 11, wherein the network signal includes a payload part containing data transmitted via the network signal and an overhead part including information about the network signal and the transmitted payload part is similar for all connections (4,41-43;5,51-52,54) and the overhead part is different for at least some connections (4,41-43;5,51-52,54), whereby the transmitted overhead part contains information about the corresponding payload and the connection the overhead part is transmitted by, and the step of performing a signal fail or signal degrade check includes checking the quality of the overhead for each of the connections (4,41-43;5,51-52,54) via which the network signal is transmitted.

13. A first network end node (1) arranged for protection switching, including: at least one input port (11); at least one output port (12); and a protection switch (14) for protection switching in a point-to-multipoint network, the protection switch (14, 212-213,222-223) being connected to said input port (11) and said output port (12), said first network end node being connected to a first connection via at least one of the at least one input ports and at least one of the at least one output ports; characterized in that the protection switch (14) includes at least one linear protection switch (141,212-213,222-223) for linear protection switching a separate point-to-point part of a point-to-multipoint network independently of switching of other point-to-point parts of said point-to-multipoint network, wherein a point-to-point part includes at least said first network end node (1) connected to one second network end node (21-24).

14. A first network end node as claimed in claim 13, wherein the linear protection switch (141) is an unidirectional protection switch for either switching data transmitted by the first network end node (1) or switching data received by the first network end node (1).

15. A first network end node as claimed in claim 13, wherein the linear protection switch is a bi-directional protection switch for switching both data transmitted by the first network end node (1) and received by the first network end node (1).

16. A first network end node as claimed in and of the claims 13, wherein said linear protection switch (141,212-213,222-223) includes signal fail or signal degrade check means (141).

17. A first network end node as claimed in claim 16, wherein said linear protection switch (141,212-213,222-223) further includes at least one conditional switch (143,213,223) connected to said at least one signal fail or signal degrade check means (142,212, 222).

18. A first network end node as claimed in claim 17 wherein the signal fail or signal degrade check means (142) include signal quality check means for checking the quality of a network signal transmitted to the first network end node (1) via simultaneously said first connection (4,41-43) and at least one second connection (5,51-52,54) connected to said second network end node (21-24) and for activating the linear protection switch (141) if the quality of the network signal transmitted via said first connection (4, 41-43) is lower than the quality of the network signal transmitted via the at least one second connection (5,51-52,54).

19. A first network end node as claimed in claim 18, wherein the signal fail or signal degrade check means (142) include data packet check means for determining errors in the network signal transmitted to the first network end node (1) via simultaneously said first connection (4,41-43) and said at least one second connection (5,51;5,52;5,54) and for activating the linear protection switch (141) if an error is detected in the network signal transmitted via the first connection (1).

20. A first network end node as claimed in claim 19, wherein the data packet includes a payload part containing data transmitted via the data packets and an overhead part including information about the network signal and the payload part transmitted is similar for all connections (4,41-43;5,51-52,54) and the overhead part is different for all connections (4,41-43;5,51-52,54), whereby the overhead part transmitted via each connection (4,41-43, 5, 5, -52, 54) differs at least in that the overhead part contains information about the connection (4,41-43;5,51-52) the data packet is transported by.

21. A first network end node as claimed in claim 13, wherein the first network end node (1) is further connected to another network via at least one third connection (3) connected to at least one of the at least one input ports (11) and output ports (12).

22. A first network end node (1) as claimed in claim 13, wherein the first network end node (1) further includes a router device (13,131-133) for routing data

packets transmitted to said first network end node (1) to one of the at least one output ports (12), said router device (13,131-133) being connected to the protection switch (14).

23. A first network end node (1) as claimed in claim 13, wherein the first
5 network end node (1) further includes a switch device (13,131-133) for switching data packets transmitted to said first network end node (1) to one of the at least one output ports (12), said switch device (13,131-133) being connected to the protection switch (14),

24. A first network end node as claimed in claim 13, wherein said first
10 network end node (1) is a Line Termination device and said at least one second network end node (21-24) is a Network Termination device.

25. A first network end node as claimed in claim 13, wherein said first
network end node (1), said second network end nodes (21-24) are a optical network
end nodes, said first connection (4,41-43) and said at least one second connection
15 (5,51-52,54) are optical fiber connections.

26. A first network end node as claimed in claim 13, wherein said first
network end node (1), said second network end nodes (21-24) are a wireless network
end nodes, said first connection (4,41-43) and said at least one second connection
(5,51-52,54) are wireless connections.

27. A network end node system comprising at least one first network end
20 node being connected by at least one first connection (4,41-43) to at least one second network end node (21-24), wherein at least one of the at least one second network end nodes (21-22) is a protected second network end node (21-24) further connected to said first network end node (1) via at least one second connection (5,
25 51-52, 54) characterized in that at least one of the at least one first network end nodes is a first network end node as claimed in any of the claims 16-31.

28. A point-to-multipoint network, as claimed in claim 27 characterized in that, the network is an passive optical network.

29. A point-to-multipoint network, as claimed in claim 27 characterized in that,
30 the network is in accordance with ITU recommendation 6.983.1 Option C.